

## Summary for Midterm One - Math 120

The core of your studying should be the assigned homework problems: make sure you really understand those well before moving on to other things (like the old midterms on the test archive).

- Chapter 1 - Warm Up
  - One of the most important ideas of this chapter is that of *multiplying by one* as a means of unit conversion. This idea makes all unit conversions have a common method, and helps one's notekeeping.
  - Introduction of variables for unknown quantities is a crucial idea illustrated in this chapter.
- Chapter 2 - Imposing Coordinates
  - This chapter introduced the use of the *coordinate system* and the *distance formula*.
  - A classic problem from this chapter is one in which two objects are moving and we need to describe the distance between them.
- Chapter 3 - Three Simple Curves
  - This chapter introduces circles, and horizontal and vertical lines. You should be sure you are comfortable finding the equation of a circle from a variety of descriptions.
  - You should be able to complete the square on a circle equation in order to find the circle's center and radius.
  - You should be able to find the intersection of a circle with a vertical or horizontal line.
- Chapter 4 - Linear Modeling
  - In this chapter, we got the general line definition.
  - Be sure you are able to find the intersection of a given circle with a general line.
  - We used the idea of perpendicular lines, and have a method for finding the shortest distance between a line and a point not on that line.
  - We considered tangent lines to circles.
  - Uniform linear motion was introduced. You should be able to model the motion of anything moving at a constant speed along a line with a pair of **parametric equations**.
- Chapter 5 - Functions and Graphs
  - Here the *function* is introduced.
  - Every function has a domain, range and graph. Be sure to know what each is, and how to determine it for a given function. As we said, finding the range and graph can be hard; rest assured, if you are asked to find the range or graph of a given function, it will be doable.
  - Given a function  $f(x)$ , you should be able to simplify expressions like
$$\frac{f(x + 2h) - f(x - 2h)}{h}.$$
  - You should be comfortable with *multipart* functions (what are they, how to evaluate one, how to solve equations involving them, etc.) What's an example of a multipart function?
- Chapter 6 - Graphical Analysis

- Chapter 6 talks about a variety of function-related topics.
  - You should understand how to graph a multipart function, where each part is linear.
  - You should be able to create multipart functions from geometric descriptions (e.g., "pizza" problems, "baseball diamond" problems, "trough" problems).
  - You should be able to solve equations involving multipart functions.
  - You should understand the effect of applying absolute value to a function. How does the graph of  $f(x)$  compare with the graph of  $|f(x)|$ ?
- Chapter 7 - Quadratic Modeling
    - The *quadratic* function is introduced. You should know the significance of the *vertex* and how to find it. You should be able to sketch the graph of a given quadratic function.
    - You should be able to determine a quadratic function given three points on its graph.
    - You should be able to determine the maximum and minimum value of a quadratic function on a specified interval.
    - You do **not** need to be able to solve problems that involve maximizing area, revenue, or other quantities. You will see many examples of these problems in the test archive. These sorts of problems are part of the latter half of chapter 7, and we'll study them after the midterm exam.
    - You should be able find the maximum or minimum possible value of a quantity by expressing it as a quadratic function of some other quantity (e.g., area of a rectangular enclosure as a function of the width of the enclosure, etc.).
    - You should be able to find how close together two things exhibiting uniform linear motion get.